

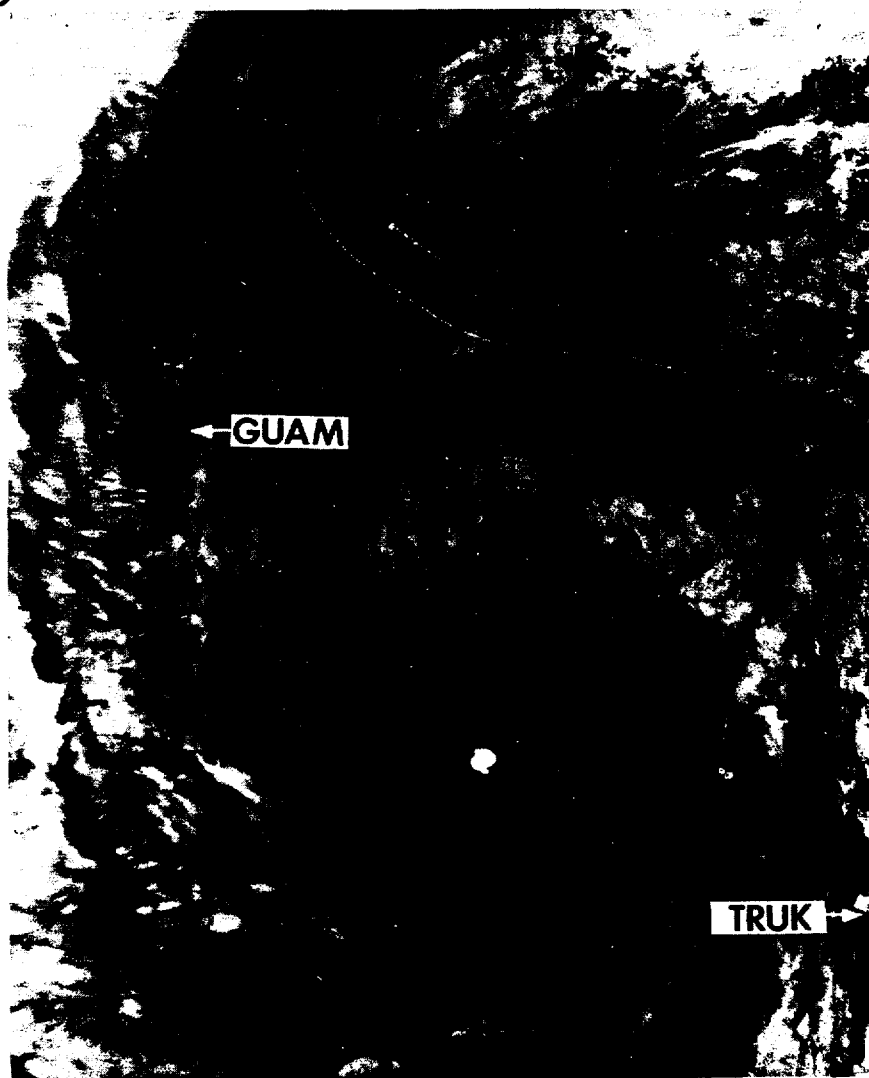
66



1976

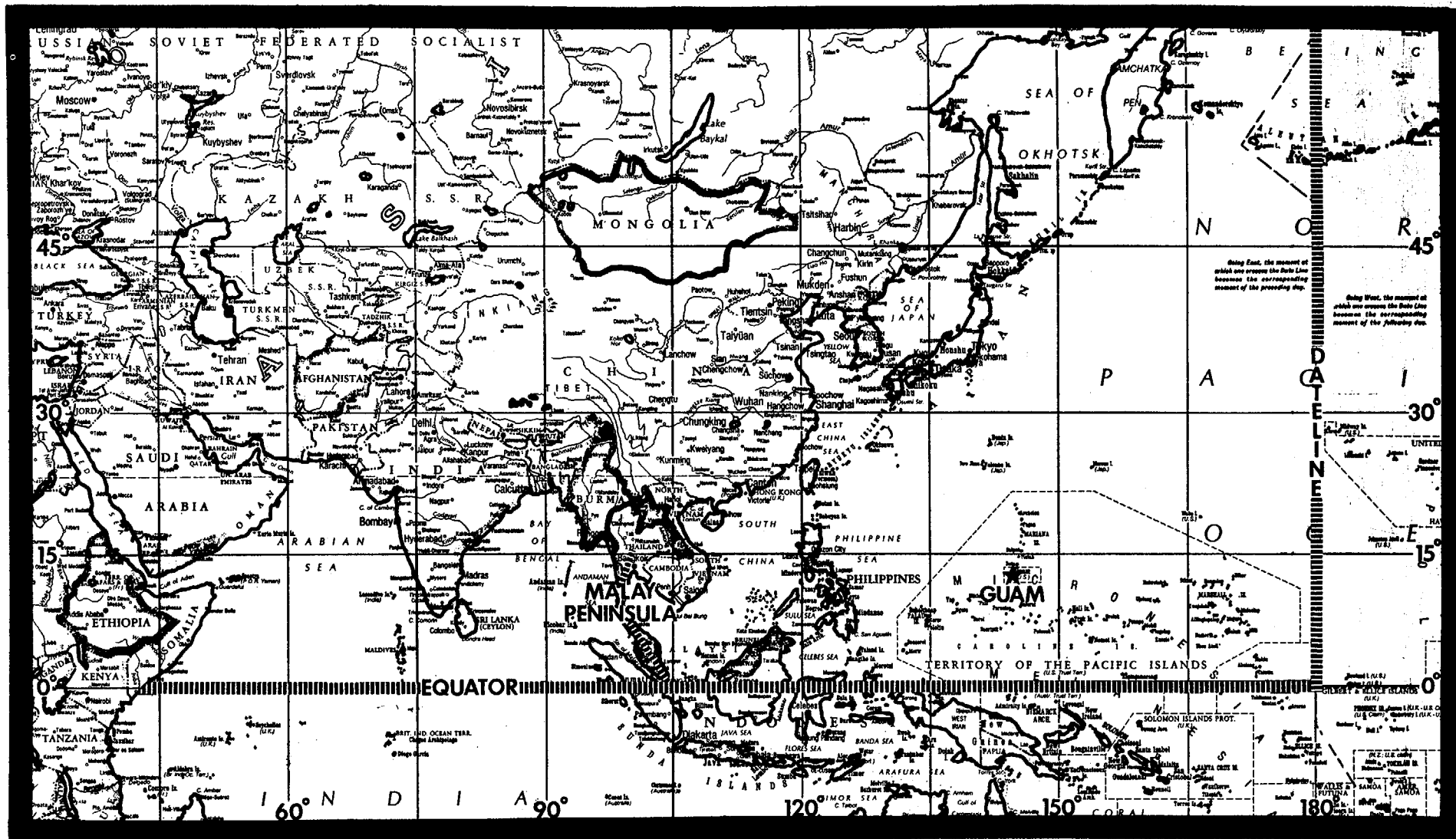


ANNUAL TYPHOON REPORT



JOINT TYPHOON WARNING CENTER
GUAM, MARIANA ISLANDS

* TECH LIBRARY COPY *



Indian Ocean Area (Malay Peninsula to Africa)

Pacific Area (Dateline to Malay Peninsula)

AREA OF RESPONSIBILITY - JOINT TYPHOON WARNING CENTER, GUAM

U. S. FLEET WEATHER CENTRAL
JOINT TYPHOON WARNING CENTER

COMNAVMARIANAS BOX 17
FPO SAN FRANCISCO 96630

DEAN R. MORFORD
Captain, United States Navy

COMMANDING

SERHIJ PILIPOWSKYJ
Lieutenant Colonel, United States Air Force
DIRECTOR, JOINT TYPHOON WARNING CENTER

STAFF

*LCDR Edward J. Harrison, Jr., USN
LCDR David Sokol, USN
*LT Douglas R. Moran, USN
LT Gary R. Willms, USN
LT George T. McKaige, USN
*CAPT Charles R. Sikora, USAF
CAPT Frederick P. Milwer, USAF
CAPT Charles P. Guard, USAF
ENS Edward M. Fukada, USNR
MSGT Philip A. Charron, USAF
SSGT Ellis D. Spencer, USAF
*SSGT Maurice L. Wymore, USAF
SSGT Bobby L. Setliff, USAF
AG2 Greg P. Metzger, USN
AG3 Robert L. Hern, Jr., USN
AG3 Susan J. Funk, USN
*AGAN Deborah H. Walker, USN
AGAN Deirdre A. Wexler, USN
SRA Craig A. Anderson, USAF
A1C Vandora A. Barnes, USAF
Ms. Gail E. James, Secretary

CONTRIBUTOR

Det 1, 1WW - USAF

1976
ANNUAL TYPHOON REPORT

*Departed during 1976 season

FRONT COVER:

Infrared photograph of Super Typhoon Pamela near peak intensity 275 nm southeast of Guam, 19 May 1976, 0901Z. Pamela subsequently passed directly over Guam inflicting massive damage to military and civilian facilities. Details of this destructive storm begin on page 24. (DMSP imagery)

FOREWORD

For centuries tropical cyclones have been a menace to both military and civilian activities in tropical and subtropical oceanic regions. During recent times much effort has been funneled toward more accurate tropical cyclone forecasts, and toward more efficient operational responses to these storms. A large portion of this effort has been based on studies which, if meaningful, must be based on accurately documented data. The Annual Typhoon Report represents such documentation. The body of this report summarizes the tropical cyclones occurring during 1976 in the western North Pacific, the Central North Pacific and the North Indian Oceans. The United States National Weather Service publishes summaries of eastern North Pacific tropical cyclones in the Mariners Weather Log, and Pilot Charts.

The PACOM Tropical Cyclone Warning System (western North Pacific and Indian Oceans) insures warnings of these dangerous storms is provided to all U. S. government interests. It consists of the Fleet Weather Central/Joint Typhoon Warning Center (FLEWEACEN/JTWC), the U. S. Air Force 54th Weather Reconnaissance Squadron stationed at Andersen AFB, Guam, and the U. S. Air Force Weather Service Defense Meteorological Satellite Program (DMSF) sites at Nimitz Hill, Guam; Clark AB, Philippines; Kadena AB, Okinawa; Osan AB, Korea; Hickam AFB, Hawaii; and the Air Force Global Weather Central, Offutt AFB, Nebraska. Additionally, satellite support is provided by the Fleet Weather Facility, Suitland, Maryland.

The Fleet Weather Central/Joint Typhoon Warning Center, Guam has the responsibility to:

1. Provide continuous meteorological watch of all tropical activity north of the

Equator, west of the Date Line, and east of the African coast (JTWC area of responsibility) for potential tropical cyclone development;

2. Provide warnings for all tropical cyclones within the area of responsibility;

3. Determine tropical cyclone reconnaissance requirements and assign priorities;

4. Conduct post-analysis studies including preparation of the Annual Typhoon Report; and

5. Conduct tropical cyclone research and forecast improvement studies as time permits.

JTWC is an integral part of FLEWEACEN Guam and is manned by officers and enlisted personnel from both the Air Force and Navy. The senior Air Force officer is designated as the Director, JTWC, and the senior Naval officer as the Deputy Director, JTWC.

Detachment 17, 30th Weather Squadron, Yokota AB, Japan with assistance from the Naval Weather Facility, Yokosuka, Japan and computer support from Fleet Weather Central, Pearl Harbor, Hawaii is designated as the Alternate Joint Typhoon Warning Center in the event that FLEWEACEN/JTWC, Guam is incapacitated.

The Central Pacific Hurricane Center, Honolulu, Hawaii, is responsible for the area north of the equator from the Date Line east to 140W. Warnings are issued in coordination with FLEWEACEN, Pearl Harbor and Detachment 4, 1WW, Hickam AFB, Hawaii.

CINCPACFLT, CDRUSACSG, and CINCPACAF are responsible for further dissemination, and if necessary, local modification of tropical cyclone warnings to U. S. government interests.

TABLE OF CONTENTS

CHAPTER I	OPERATIONAL PROCEDURES		page	
	1. General-----		1	
	2. Analyses and Data Sources-----		1	
	3. Forecast Aids-----		1	
	4. Forecasting Procedures-----		2	
	5. Warnings-----		2	
	6. Prognostic Reasoning Message-----		2	
	7. Significant Tropical Weather Advisory-----		2	
	8. Tropical Cyclone Formation Alert-----		2	
CHAPTER II	RECONNAISSANCE AND COMMUNICATIONS			
	1. General-----		3	
	2. Reconnaissance Responsibility and Scheduling-----		3	
	3. Aircraft Reconnaissance Evaluation Criteria-----		3	
	4. Aircraft Reconnaissance Summary-----		4	
	5. Satellite Reconnaissance Summary-----		5	
	6. Radar Reconnaissance Summary-----		6	
	7. Communications-----		6	
CHAPTER III	RESEARCH SUMMARY			
	1. General-----		7	
	2. Cross-Equatorial Interactions in the Development of a Winter Typhoon: NANCY 1970-----		7	
	3. Tropical Cyclone Center Fix Data for the 1975 Typhoon Season-----		7	
	4. An Evaluation of Utilizing Equivalent Potential Temperature as a Measure of Tropical Cyclone Intensity-----		7	
	5. Radius of Wind Field Surrounding a Tropical Cyclone-----		7	
	6. Correlation of JTWC Initial Position Error to Forecast Position Errors in the Western North Pacific-----		7	
	7. The Influences of the Tropical Upper Tropospheric Trough (TUTT) on Erratic Movement of Tropical Cyclones-----		7	
	8. The Development and Movement of Tropical Cyclones in Deep Southwesterly Monsoon Surges-----		8	
	9. Operational Applications of a Recurvature - Non-Recurvature Study Based on 200 MB Wind Fields-----		8	
CHAPTER IV	SUMMARY OF TROPICAL CYCLONES			
	1. General Resume-----		9	
	2. Western North Pacific Tropical Cyclones-----		13	
	3. Individual Typhoons-----		18	
		page	page	
	Typhoon Kathy-----	18	Typhoon Anita-----	36
	Typhoon Marie-----	20	Typhoon Billie-----	38
	Typhoon Olga-----	22	Typhoon Fran-----	42
	Typhoon Pamela-----	24	Typhoon Hope-----	46
	Typhoon Ruby-----	30	Typhoon Iris-----	48
	Typhoon Sally-----	32	Typhoon Joan-----	50
	Typhoon Therese-----	34	Typhoon Louise-----	52
	4. North Indian Ocean Tropical Cyclones-----			56
	5. Central Pacific Tropical Cyclones-----			58
	6. Tropical Cyclone Center Fix Data-----			60
CHAPTER V	SUMMARY OF FORECAST VERIFICATION DATA			
	1. Annual Forecast Verification-----			61
	2. Comparison of Objective Techniques-----			61
	3. Pacific Area Tropical Storm and Depression Data-----			67
	4. Pacific Area Typhoon Data-----			72
	5. Indian Ocean Area Cyclone Data-----			83
	6. Central Pacific Hurricane Data-----			85
APPENDIX	ABBREVIATIONS, ACRONYMS AND DEFINITIONS			
	1. Abbreviations and Acronyms-----			86
	2. Definitions-----			86
DISTRIBUTION				88